# Compliance Frameworks Systems Engineering Standards

**Terry Doran**

**NDIA Systems Engineering & Supportability Conference**

**October 25, 2000**



SOFTWARE PRODUCTIVITY CONSORTIUM

# Questions You Might Have

How many SE standards and models are there?

Why are there so many?

What's the difference between a standard and a model?

What good are standards and models?

How are SE standards and models changing?

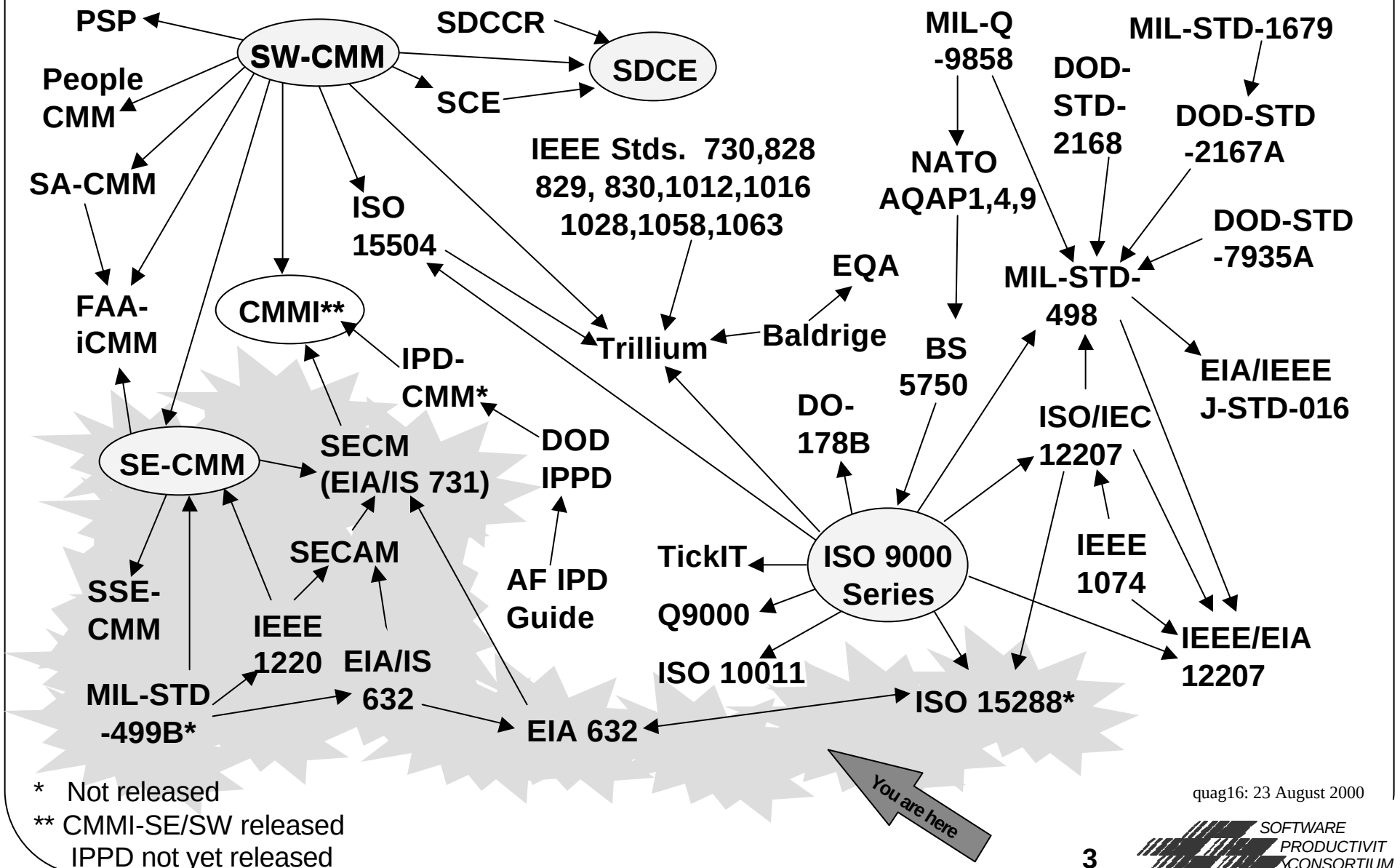
Which ones do I have to comply with?

How hard is it to comply with all of them?



SOFTWARE PRODUCTIVITY CONSORTIUM

# The Frameworks Quagmire




* Not released

** CMMI-SE/SW released
IPPD not yet released

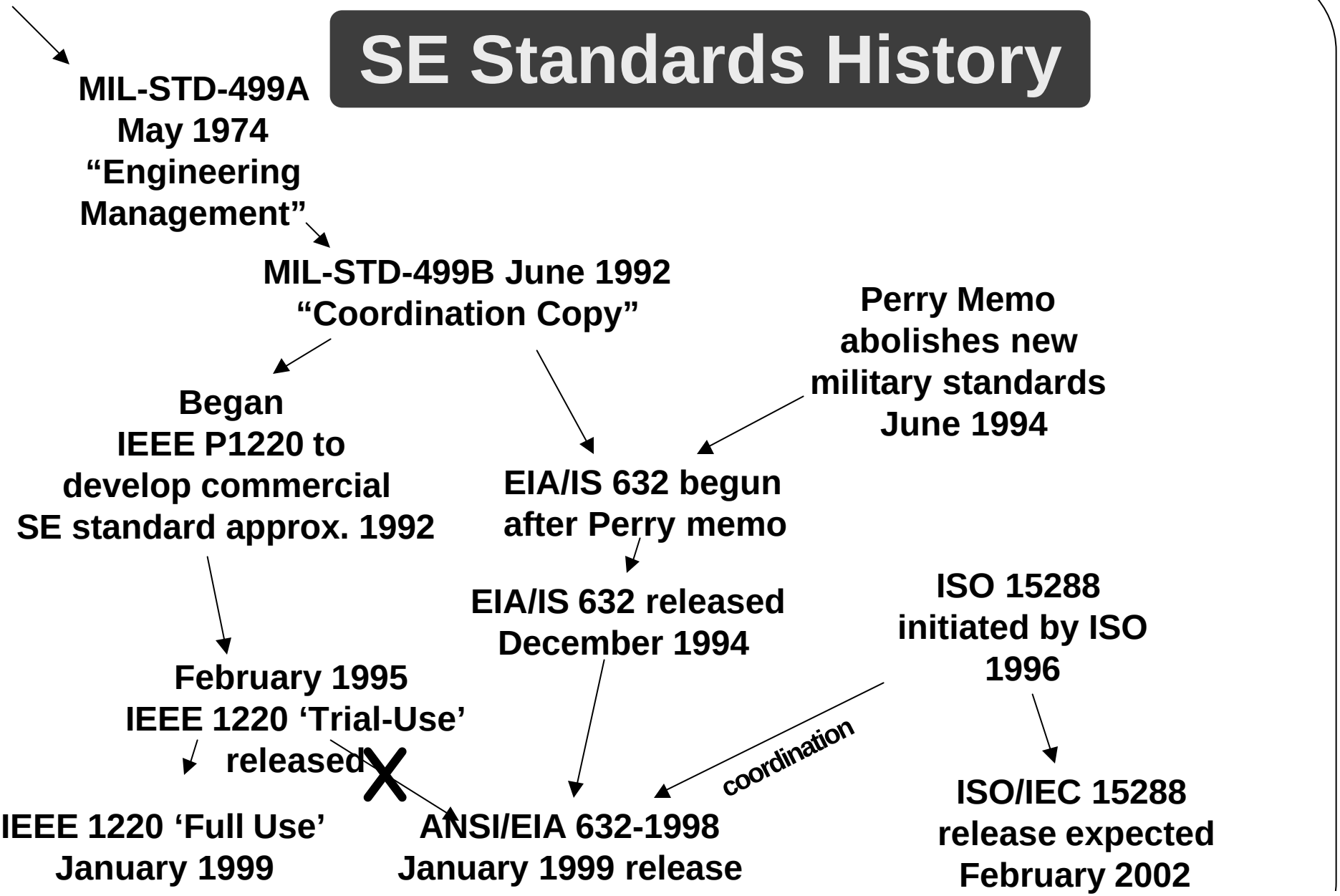


SOFTWARE PRODUCTIVITY CONSORTIUM

# Systems Engineering Standards

- **MIL-STD-499B. Systems Engineering, *5/6/92***
- **EIA/IS 632. Systems Engineering, Interim Standard, 12/94**
- **IEEE 1220. IEEE Standard for Application and Management of the Systems Engineering Process, Trial-Use 2/95, Full-Use 1/99**
- **EIA 632. Processes for Engineering a System, 1/99**
- **ISO 15288. Life Cycle Management—System Life Cycle Processes, 9/00 draft for CD #3 or FCD**

# SE Standards History



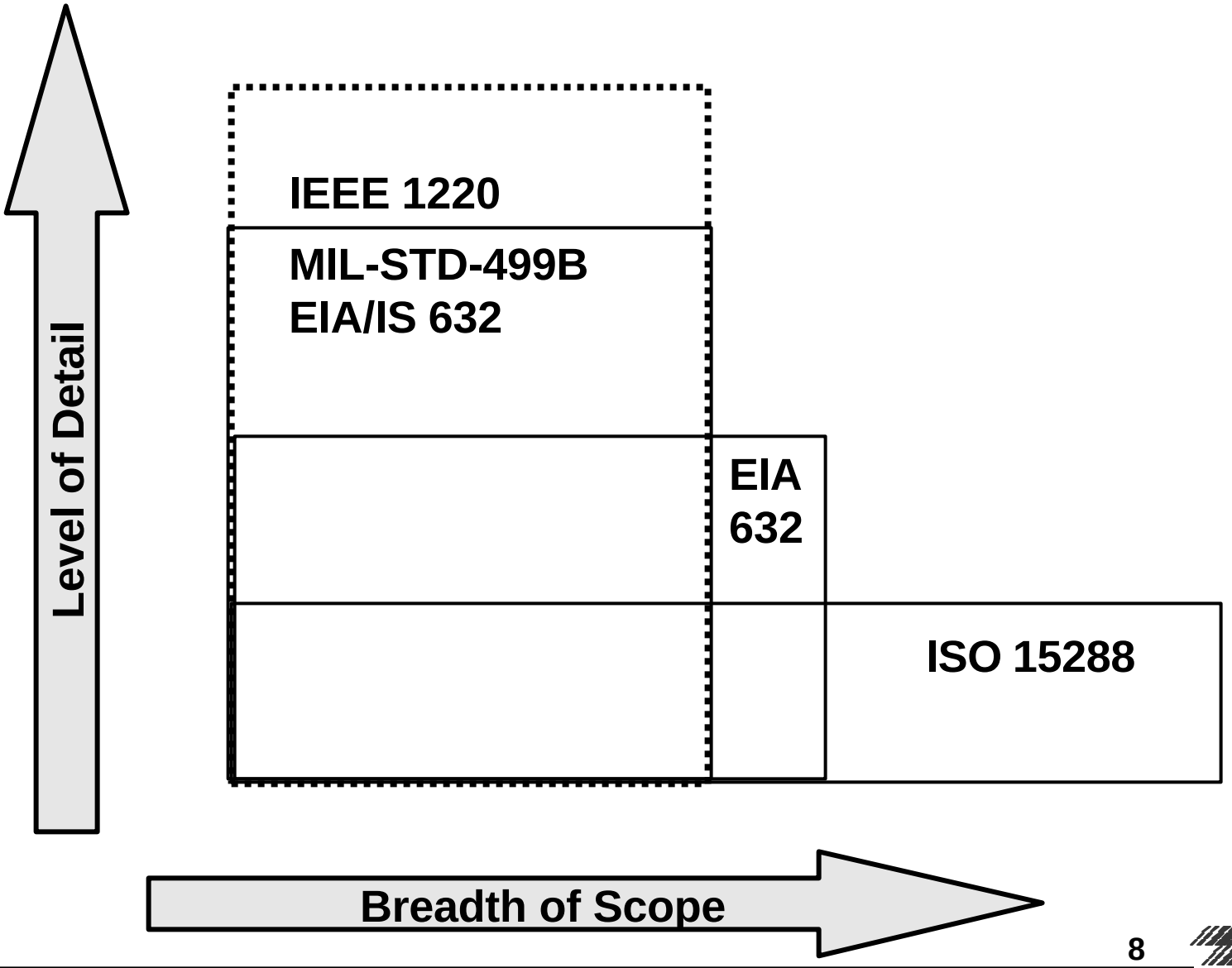
# Standards Commonality

- **History (evolution from one to the next)**
  - **Owners (affiliation) and applicability**
  - **Authors**
  - **Reviewers**
- **Scope**
  - **Total system approach**
  - **Transformation of needs into solutions**

# Standards Differences

- History details
  - US vs. international
  - Military vs. commercial
- SE process elements and life cycle
- Definitions of system and systems engineering
- Level of detail, and text vs. graphical descriptions
- Focus
  - Contract vs. system vs. enterprise vs. product

# Scope of SE Standards






SOFTWARE PRODUCTIVITY CONSORTIUM

# MIL-STD-499B

## “Systems Engineering”

- Never released; 6 May 92 version intended to replace 1 May 74 MIL-STD-499A, “Engineering Management”
- Shortly thereafter, Air Force approval of May 92 version for application to contracts that are still in force
- Military contract language (“shall”) and implied military contract focus
- Detail to activity level of SE process
- Used as basis for other SE standards; set terminology and initially described SE process

# EIA/IS 632

**“Systems Engineering”**

- **IS release December 15, 1994**
  - **Interim Standards: annual review and up to 5 year lifespan**
- **Commercialized version of MIL-STD-499B**
  - **Uses less military language and life cycle, but actually geared to same target audience**
- **Same level of detail as MIL-STD-499B (nearly identical content)**

# IEEE 1220

**"IEEE Standard for Application and Management of the Systems Engineering Process"**

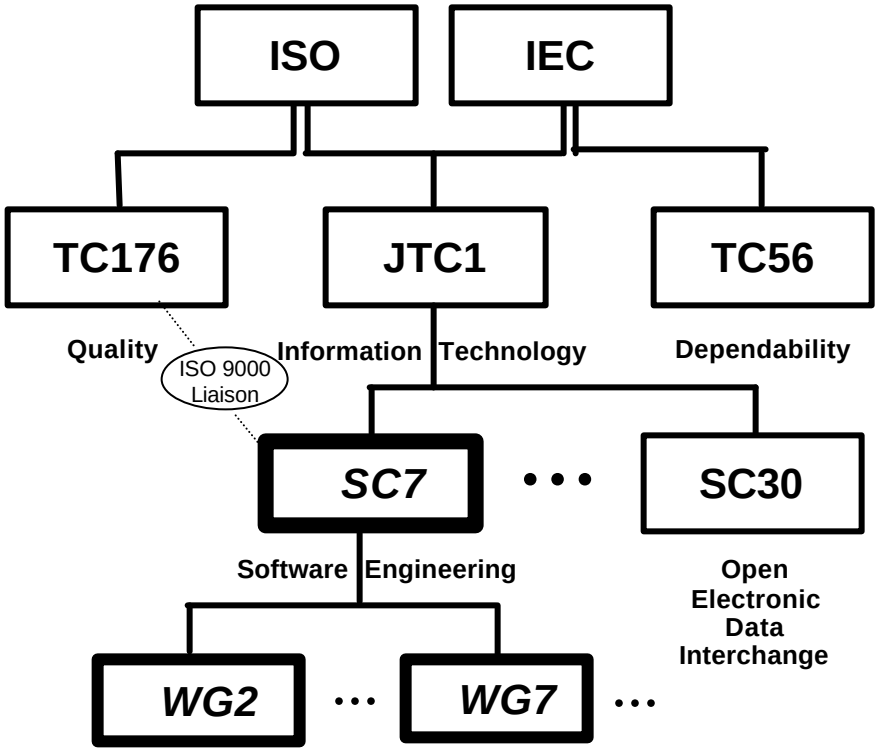
- **February 28, 1995 Trial Use release**
  - **Intended lifetime of 2 years, for projected IEEE 1220 and EIA/IS 632 merge**
- **Focused more on enterprise and less on any specific system being built**
- **More detailed than MIL-STD-499B or EIA/IS 632**
  - **To the detailed task level of the SE process**
- **January 22, 1999 Full Use release**
  - **Nominal revisions**

# EIA 632

**“Processes for Engineering a System”**

- **ANSI/EIA 632 - 1998 approved January 1999**
- **Joint project of INCOSE and EIA**
- **Broader scope than previous SE standards and less detailed: 33 requirements set in context of application environment & application key concepts**
  - **Project { Enterprise { External Environments**
  - **System consisting of End Products & Enabling Products**
  - **Building block structure**
  - **Processes applicable at any point in Product Life Cycle**

# International System and Software Standards Development Through SC7




**Members of these committees are national bodies, i.e. countries.**

## SC7 Working Groups (WGs)

**WG2 – System Software Documentation**
**WG4 – Tools and Environments**
**WG6 – Evaluation and Metrics**
**WG7 – Life Cycle Management**
**WG8 – Support of Life Cycle Processes**
**WG9 – Software and System Integrity**
**WG10 – Software Process Assessment**
**WG11 – Software Engineering Data Definition and Representation**
**WG12 – Functional Size Measurement**
**WG13 – Measurement Process Framework**
**WG14 – Enhanced LOTOS**
**WG15 – ODP Frameworks and Components**
**WG16 – ODP Quality of Service**
**WG17 – ODP Enterprise Language**

**WGs with systems scope**

**USTAG members are US based companies and organizations.**

**USTAG Technical Groups (TGs) correspond to SC7 WGs.**



SOFTWARE PRODUCTIVITY CONSORTIUM

# ISO 15288

**"Systems Engineering — System Life Cycle Processes" ISO/IEC 15288**

- **Draft for CD #3 or Final Committee Draft – 1 SEP 00… Expected release in FEB 02**
- **International effort by same subcommittee that authored ISO/IEC 12207, augmented with SE expertise**
- **Intent to be high level, common framework for describing LC of systems based on well-defined processes and terminology**
  - **Processes defined i/t/o purpose, outcomes & activities**
  - **Does not detail methods or procedures**
- **Guidebook project approved; ISO/IEC TR WD #1 1SEP00**

# ISO 15288
# Draft for CD#3 Contents

**Clauses 1-6 + Annex A: Normative**

**1. Scope**

**2. Conformance**

- **Full**
- **Tailored**
- **Compliance with an Agreement**

**3. Normative References**

- **ISO 9001:2000**
- **ISO 12207:1995**

**4. Terms & Definitions**

**5. SLC Processes**

**6. SLC Stages**

**Annex A – Tailoring**

- **Tailoring Process**
- **Tailoring Process Outcomes**
- **Tailoring Process Activities**

**Annexes B – D: Informative**

**Annex B – SLC Stages**

**Annex C – Relationship 15288 & 12207**

**Annex D – Concepts**

# Draft Contents (cont.)

**5. SLC Processes**

- **Agreement Processes**
  - **Acquisition**
  - **Supply**
- **Enterprise Processes**
  - **Enterprise Management**
  - **Investment Management**
  - **SLC Processes Management**
  - **Resource Management**
- **Project Management Processes**
  - **Planning**
  - **Assessment**
  - **Control**
  - **Decision Making**
  - **Risk Management**
  - **Configuration Management**

**SLC Processes (cont.)**

- **Technical Processes**
  - **Stakeholder Requirements Definition**
  - **Requirements Analysis**
  - **Architectural Design**
  - **Implementation**
  - **Integration**
  - **Verification**
  - **Transition**
  - **Validation**
  - **Operation**
  - **Maintenance**
  - **Disposal**

# Draft Contents (cont.)

**6. SLC Stages**

- **A SLC model required**
- **One or more stage models, as needed**
- **Overlap & iterate as appropriate**

**A SLC Example**

- **Concept Stage**
- **Development Stage**
- **Production Stage**
- **Utilization Stage**
- **Support Stage**
- **Disposal Stage**

# Some Issues

**WG7 Meeting – 30OCT00 - 3NOV00 – Perth, Australia**

**ISO/IEC 15288 CD #3 or FCD**

- **Comments not incorporated**
- **Traceability**
- **Principles**
- **Standard/Guidebook allocation**

# References

- **Software Productivity Consortium**

  **& The Quagmire on the web: www.software.org**

- **ISO On-Line: www.iso.ch**

- **INCOSE Standards Committee & Links: www.incose.org**

- **EIA/G47 for EIA 632 & EIA 731: www.geia.org**

- **IEEE Standards: www.ieee.org**

# Contact Information

**Terry Doran**

**Software Productivity Consortium**

**Systems Engineering Group**

**doran@software.org**

**Tel: 703-742-7190**

**Fax: 703-742-7200**



SOFTWARE PRODUCTIVITY CONSORTIUM